Polarization Measurements of RHIC-pp RUN05 Using CNI pC-Polarimeter

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The polarization of the proton beams at RHIC are measured using both a hydrogen jet and carbon polarimeter. The carbon polarimeter measures relative polarization to a few percent statistical accuracy within 20 to 30 seconds using an ultra-thin (~3.5 μ g/cm²) carbon ribbon target, providing fast feedback to beam operations and experiments. The absolute normalization is provided by the hydrogen polarimeter which has an even thinner gas target takes a longer time to accumulate sufficient statistics. Taking advantage of the maximized analyzing power in the Coulomb-Nuclear Interference (CNI) region at very small momentum transfer (-t ~ 0.003 (GeV/c)²), both polarimeters detect the recoil proton/carbon through the elastic scattering process at 90 degrees along the beam direction. In this talk, I will focus on the RUN05 analysis of the carbon target pC polarimeter.

RUN05 is the first extended operation of polarized proton-proton beams at RHIC. We accumulated nearly 3000 polarization measurements using the pC polarimeters during the three months running period. Continuous efforts were made in the accelerator tuning in order to improve the quality of the beam, for example polarization, intensity, emittance and backgrounds. Thus these measurements were not necessarily performed always under the same accelerator/detector conditions and therefore careful analysis was required in order to study possible effects on the measured polarizations. Slowly evolving changes, for example, an accumulated radiation damage to the detectors is the one of the major concerns because of the longer exposure to the relatively higher beam intensity compared to previous runs. In this talk, I will discuss the stability of polarization results through measurements as well as comparing online and offline analyses.